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EXAMINER				
KEEHN, RICHARD G				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

**Application No.**

10/719,487

**Applicant(s)**

CORONADO ET AL.

**Examiner**

Richard G. Keehn

**Art Unit**

2456

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 April 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2009 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CD/CD)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

### **DETAILED ACTION**

**Claims 1-30 have been examined and are pending.**

#### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/1/2009 has been entered.

#### ***Response to Arguments***

2. Applicant's arguments with respect to the drawings filed 4/1/2009 have been fully considered but they are not persuasive. See Drawings section below.

3. Applicant's arguments with respect to the prior art rejection of claims 1-30 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Drawings***

4. The drawings were received on 4/1/2009. These drawings are not acceptable because they introduce new matter. New matter is found in Figure 3A, element 305 wherein reference to SAN "in communication with said second information storage and retrieval system via a fifth plurality of communication links" is new.

5. Also the replacement sheet makes reference to a Figure 3B, which was not received. Figure 3A appears to extend to another sheet, but that sheet is not present. It appears that Applicant intended to supply a sheet 3B which would contain elements 355, 360, 370, 380, 390 and 410 from originally submitted Figure 3.
6. Appropriate corrections are required.

### ***Specification***

7. The amendment filed 4/1/2009 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: The amended drawing and Claims 1, 11 and 21 recite the SAN is "in communication with said second information storage and retrieval system via a fifth plurality of communication links" which was not previously disclosed in the specification, drawings nor claims despite Applicant's argument to the contrary on page 23 of the arguments. According to Figure 2A, the fifth plurality of communication links is between the first and second storage and retrieval systems, not the second storage and retrieval system and the SAN. Applicant's specification discusses the communication between the first and second storage and retrieval systems, but makes no mention of any communication between the SAN and second storage and retrieval system.

Applicant is required to cancel the new matter in the reply to this Office Action.

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1, 11 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 11 and 21 recite the SAN is "in communication with said second information storage and retrieval system via a fifth plurality of communication links" which was not previously disclosed in the specification, drawings nor claims despite Applicant's argument to the contrary on page 23 of the arguments. According to Figure 2A, the fifth plurality of communication links is between the first and second storage and retrieval systems, not the second storage and retrieval system and the SAN. Applicant's specification discusses the communication between the first and second storage and retrieval systems, but makes no mention of any communication between the SAN and second storage and retrieval system.
10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1, 11 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. Claim 1 recites the limitation "plurality of host computers" in the middle of page 4. Claims 11 and 21 have similar limitations. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

13. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

14. Claims 1-4, 11-14 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over non-patent literature dated March 21, 1995 entitled "HP-UX 10.0 Logical Volume Manager White Paper" (Hewlett-Packard), and further in view of US 2003/0188188 A1 (Padmanabhan et al.) and US 2003/0041211 A1 (Merkey et al.).

As to Claims 1, 11 and 21, Hewlett-Packard discloses a method, an article of manufacture comprising a computer useable medium having computer readable program code, and a computer program product encoded in an information storage medium and usable with a programmable computer processor (hereby referred to as "the system") to control access to logical volumes disposed in one or more information storage and retrieval systems using copy service relationships, comprising the steps of:

providing a first information storage and retrieval system comprising a plurality of first logical volumes (Hewlett-Packard – Page 5 recites mirroring wherein separate first and second and third logical volumes are paired to create a copy of one another);

providing a second information storage and retrieval system comprising a plurality of second logical volumes (Hewlett-Packard – Page 5 recites mirroring wherein separate first and second and third logical volumes are paired to create a copy of one another);

providing three host computers (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers {plurality not necessarily limited to three} connected via I/O channels or interface adapters. One of ordinary skill in the art at the time the invention was made would have been motivated to provide three hosts for improved reliability, uptime, facilitating maintenance without downtime, and fault recovery);

forming (N) host computer groups, wherein (N) is greater than or equal to 1 (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers connected via I/O channels or interface adapters);

assigning each of said plurality of host computers to the a host computer group (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers connected via I/O channels or interface adapters);

forming (N) logical volume groups (Hewlett-Packard – Page 6 recites the Logical Volume Group);

assigning one or more of said plurality of first logical volumes to a logical volume group (Claims 11 and 21 only, omitted from Claim 1 by Applicant) (Hewlett-Packard – Page 5 recites the Physical Volume Group of separate computers connected via I/O channels or interface adapters);

receiving a request from a host computer assigned to the (i)th host computer group to establish a copy service relationship between a source logical volume and a target logical volume (Hewlett-Packard – page 21 recites the “lvmerge” and “lvcreate” commands used to create mirrored logical volume relationships);

determining if said source logical volume is assigned to the (i)th logical volume group (Hewlett-Packard – page 21 recites the “lvdisplay” command used to retrieve information about logical volumes);

operative if said target logical volume is assigned to the (i)th logical volume group, determining if said second logical volume is assigned to the (i)th logical volume group (Hewlett-Packard – page 21 recites the “lvdisplay” command used to retrieve information about logical volumes including mirrored status information);

operative if both the source logical volume and the target logical volume are assigned to the (i)th logical volume group, establishing said copy service relationship (Hewlett-Packard – Page 5 recites mirroring wherein logical volumes in the same mirror grouping are placed into a copy relationship).

Hewlett-Packard does not disclose, but Padmanabhan et al. disclose wherein each of said plurality of host computers assigned to an (i)th host computer group is not assigned to any other of the (N) host computer groups, and wherein each of said logical volumes assigned to an (i)th logical volume group is not assigned to any other of the (N) logical volume groups, and wherein a host computer assigned to an (i)th host computer group has access rights to logical volumes assigned to an (i)th logical volume group, wherein (i) is greater than or equal to 1 and less than or

equal to (N) (Padmanabhan et al. – Figure 2, elements 50 recite host computers which contain their own logical volumes grouped into a logical grouping via the border server 230; which are separate and distinct from element 150 PC's logically connected to the grouping controlled by border server 231. The host computer (PC) groups and their associated volume groups are not assigned to each other. The (N) host computer groups are those assigned to each of the external non-trusted servers. The (N) logical volume groups are those associated and connected to the aforementioned (N) host computers, hence the host computers have access rights to their own volumes within their group. ¶ [0035] also recites that this network configuration can be used with mirroring).

The combination of Hewlett-Packard and Padmanabhan et al. does not disclose two clusters, wherein a remote I/O bridge interconnects said two clusters, and wherein each cluster comprises a processor, a cache, a plurality of host adapters, a plurality of device adapters, a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol; and does not disclose providing a storage area network ("SAN"), wherein said SAN is in communication with a first host computer via a first plurality of communication links, in communication with a second host computer via a second plurality of communication links, in communication with a third host computer via a third plurality of communication links, in communication with said first information storage and retrieval system via a fourth plurality of communication links, and in communication with said second information storage and retrieval system via a fifth plurality of communication links, but Merkey et al. disclose

two clusters (Merkey et al. disclose clusters – Page 4, ¶ [0085] and Figure 4c depicts two clusters: elements 450-454 and elements 460-464), wherein a remote I/O bridge interconnects said two clusters (Merkey et al. discloses the remote I/O bridge – Page 5, ¶ [0094] and Page 6, ¶ [0098]) , and wherein each cluster comprises a processor (Merkey et al. disclose a processor – Page 1, ¶ [0015]), a cache (Merkey et al. disclose cache – Page 4, ¶ [0085]), a plurality of host adapters (Merkey et al. disclose host adapters – Page 6, ¶ [0101]), a plurality of device adapters (Merkey et al. disclose device adapters – Page 3, ¶ [0076] and Page 5, ¶ [0096]), a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol (Merkey et al. disclose RAID disk drives arrays – Page 4, ¶ [0085]); and

two clusters (Merkey et al. disclose the clusters – Page 4, ¶ [0085] and Figure 4c depicts two clusters: elements 450-454 and elements 460-464), wherein a remote I/O bridge interconnects said two clusters (Merkey et al. discloses the remote I/O bridge – Page 5, ¶ [0094] and Page 6, ¶ [0098]) , and wherein each cluster comprises a processor (Merkey et al. disclose a processor – Page 1, ¶ [0015]), a cache (Merkey et al. disclose cache – Page 4, ¶ [0085]), a plurality of host adapters (Merkey et al. disclose host adapters – Page 6, ¶ [0101]), a plurality of device adapters (Merkey et al. disclose device adapters – Page 3, ¶ [0076] and Page 5, ¶ [0096]), a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol (Merkey et al. disclose RAID disk drives arrays – Page 4, ¶ [0085]); and

providing a storage area network (“SAN”), wherein said SAN is in communication with a first host computer via a first plurality of communication links, in communication

with a second host computer via a second plurality of communication links, in communication with a third host computer via a third plurality of communication links, in communication with said first information storage and retrieval system via a fourth plurality of communication links, and in communication with said second information storage and retrieval system via a fifth plurality of communication links (Merkey et al. disclose storage area network interfaces in RAID systems connecting host systems to storage systems – Page 5, ¶ [0095]. It would have been obvious, and was obvious as disclosed by implementation in this reference, to use storage area network configuration to provide high bandwidth, low latency data transfers of block based memory between those RNS systems and their local caches, without the copying overhead typical of LAN based storage - ¶ [0095].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine wherein each of said plurality of host computers assigned to an (i)th host computer group is not assigned to any other of the (N) host computer groups, and wherein each of said logical volumes assigned to an (i)th logical volume group is not assigned to any other of the (N) logical volume groups, and wherein a host computer assigned to an (i)th host computer group has access rights to logical volumes assigned to an (i)th logical volume group, wherein (i) is greater than or equal to 1 and less than or equal to (N) taught by Padmanabhan et al., with forming (N) host computer groups, wherein (N) is greater than or equal to 1; assigning each of said plurality of host computers to the a host computer group; forming (N) logical volume

groups; and assigning one or more of said plurality of first logical volumes to a logical volume group taught by Hewlett-Packard.

One of ordinary skill in the art at the time the invention was made would have been motivated to structure network architecture to provide fairness of content distribution and reduce network congestion in mirrored and shared resource applications (Padmanabhan - ¶¶ [0011-0013 and 0035]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine two clusters, wherein a remote I/O bridge interconnects said two clusters, and wherein each cluster comprises a processor, a cache, a plurality of host adapters, a plurality of device adapters, a plurality of disk drive arrays each utilizing a Redundant Array of Independent Disks protocol; and providing a storage area network ("SAN"), wherein said SAN is in communication with a first host computer via a first plurality of communication links, in communication with a second host computer via a second plurality of communication links, in communication with a third host computer via a third plurality of communication links, in communication with said first information storage and retrieval system via a fourth plurality of communication links, and in communication with said second information storage and retrieval system via a fifth plurality of communication links taught by Merkey et al., with the system to control access to logical volumes disposed in one or more information storage and retrieval systems using copy service relationships taught by the combination of Hewlett-Packard and Padmanabhan et al., in order to add high speed and fault tolerance (Merkey et al. – Page 1, ¶ [0003]).

As to Claims 2, 12 and 22, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

receiving a request to revise access rights to one or more of said plurality of first logical volumes or one or more of said plurality of second logical volumes (Hewlett-Packard, Page 21 recites the "lvcreate" and "lvchange" commands which revise, inter alia, mirroring functions);

determining if said request comprises assigning to one of said (N) logical volume groups a logical volume in a copy relationship (Hewlett-Packard – Page 21 recites the creation of logical volumes into a copy arrangement);

operative if said request comprises assigning to one of said (N) logical volume groups a logical volume in a copy relationship, denying said request (Hewlett-Packard – Page 5 recites the Quorum requirement wherein at least 50% of the mirrored volume disks must be present to change the volume group. Page 2 recites that up to 3 volumes can be mirrored. Hence if a request to change 1 of 3 mirrored volumes is presented, the quorum requirement will not be met and the request will be denied).

As to Claims 3, 13 and 23, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

receiving a request to revise access rights to one or more of said plurality of first logical volumes (Hewlett-Packard, Page 21 recites the "lvsplit" command which unassigns the volumes from a mirrored relationship);

determining if said request comprises unassigning one of said first logical volumes in a copy relationship (Hewlett-Packard, Page 21 recites the "lvsplit" command which unassigns the volumes from a mirrored relationship);

operative if said request comprises unassigning one of said first logical volumes in a copy service relationship, wherein said copy service relationship comprises a copy session, determining whether to complete said copy session and then terminate the copy service relationship (Hewlett-Packard – Page 5 recites the Quorum requirement wherein at least 50% of the mirrored volume disks must be present to change the volume group);

operative if said request comprises unassigning one of said first logical volumes in a copy service relationship and if said copy session is to be completed prior to terminating said copy service relationship (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating the mirror relationship and unassigning the mirrored volumes from their mirrored relationship);

completing said copy session (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete

before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating the mirror relationship and unassigning the mirrored volumes from their mirrored relationship);

terminating said copy service relationship (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating the mirror relationship and unassigning the mirrored volumes from their mirrored relationship); and

unassigning said one of said first logical volumes (Hewlett-Packard - Page 20 recites the synchronous mode. If running in this mode, the file system activity must complete before the process is allowed to continue. Therefore, if running in synchronous mode and an lvsplit command is issued, copy in progress would complete before terminating the mirror relationship and unassigning the mirrored volumes from their mirrored relationship).

As to Claims 4, 14 and 24, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 3, 13 and 23 respectively, further comprising the steps of:

operative if said request comprises unassigning one of said first logical volumes but does not comprise un assigning one of said first logical volumes in a copy service

relationship, unassigning said one of said first logical volumes (Hewlett-Packard – Page 17 recites the “vgexport” command which unassigns a logical volume. This works on volumes whether mirrored or not);

operative if said request comprises unassigning one of said first logical volumes in a copy service relationship and if said copy service relationship is not to be terminated denying the request to unassign said one of said first logical volumes (Hewlett-Packard – Page 5 recites the Quorum requirement wherein at least 50% of the mirrored volume disks must be present to change the volume group);

operative if said copy session will not be completed prior to terminating said copy service relationship;

terminating said copy service relationship prior to completing said copy session (Hewlett-Packard – Page 18 recites the system crash recovery wherein a volume fails, the mirroring is disabled and data is backed up on one of the previously mirrored volumes. Reassignment of the mirrored relationship occurs after the physical problem has been resolved); and

unassigning said one of said first logical volumes (Hewlett-Packard – Page 18 recites the system crash recovery wherein a volume fails, the mirroring is disabled and data is backed up on one of the previously mirrored volumes. Reassignment of the mirrored relationship occurs after the physical problem has been resolved).

15. Claims 5-7, 15-17 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hewlett-Packard, Padmanabhan et al. and

Merkey et al. as applied to claims 1, 11 and 21 above, and further in view of US 6,145,066 (Atkin).

As to Claims 5, 15 and 25, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

providing a configuration interface interconnected to said first information storage and retrieval system (Hewlett-Packard – Page 21 recites the System management commands to perform LVM configuration operations);

operative if said copy service relationship comprises a [mirroring] relationship, determining if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said copy service relationship comprises a [mirroring] relationship, determining if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy

relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time),

establishing the [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was not provided by said configuration interface, not establishing the requested [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Atkin discloses determining if said copy service relationship comprises a peer-to-peer remote copy (“PPRC”) relationship (Atkin - Column 3, lines 47-64 recite the use of the Peer-to-Peer Remote Copy feature); and the PPRC relationship (Atkin - Column 3, lines 47-64 recite the use of the Peer-to-Peer Remote Copy feature).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine PPRC taught by Atkin, with the mirroring relationship taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to add migration facility to the copy feature (Atkin – Column 4, lines 4-11).

As to Claims 6, 16 and 26, the combination of Hewlett-Packard, Padmanabhan et al., Merkey et al. and Atkin discloses the system of claims 5, 15 and 25 respectively, further comprising the steps of:

receiving a termination request to terminate said *[mirroring]* relationship (Hewlett-Packard – Page 21 recites the “lvsplit” command which terminates the mirroring relationship);

determining if said termination request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the “lvsplit” instruction which can be used to terminate a copy relationship. If the command is given, it executes the termination of a copy relationship. If the command is not given, no relationship termination is made at that time);

operative if said termination request was provided by said configuration interface, terminating the *[mirroring]* relationship (Hewlett-Packard – Page 21 recites the “lvsplit” instruction which can be used to terminate a copy relationship. If the command is given,

it executes the termination of a copy relationship. If the command is not given, no relationship termination is made at that time);

operative if said termination request was not provided by said configuration interface, denying the request to terminate the [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvsplit” instruction which can be used to terminate a copy relationship. If the command is given, it executes the termination of a copy relationship. If the command is not given, no relationship termination is made at that time).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Atkin discloses an invention substantially as claimed, including PPRC relationship (Atkin - Column 3, lines 47-64 recite the use of the Peer-to-Peer Remote Copy feature).

The motivation and obviousness arguments are the same as in Claim 5.

As to Claims 7, 17 and 27, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21.

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Atkin discloses an invention substantially as claimed, including further comprising the steps of:

determining if said requested copy service relationship comprises an extended remote copy (“XRC”) relationship (Atkin - Column 3, lines 7-21 recite the use of XRC);

operative if said requested copy service relationship comprises an XRC relationship, denying said request to establish said XRC relationship (Atkin – Column 3, lines 45-61 recite the choice of PPRC over XRC).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the exclusion of XRC taught by Atkin, with the mirroring relationship taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to avoid using a copy scheme that is complex to use and operationally expensive and resource intensive (Atkin – Column 3, lines 45-46).

16. Claims 8, 18 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. as applied to claims 1, 11 and 21 above, and further in view of US 2002/0069369 A1 (Tremain).

As to Claims 8, 18 and 28, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

providing a configuration interface interconnected with said first information storage and retrieval system (Hewlett-Packard – Page 21 recites the System management commands to perform LVM configuration operations);

operative if said copy service relationship comprises a [*mirroring*] relationship, determining if said request was provided by said configuration interface (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was provided by said configuration interface, establishing the requested [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time);

operative if said request was not provided by said configuration interface, denying the request to establish a [*mirroring*] relationship (Hewlett-Packard – Page 21 recites the “lvcreate” instruction which can be used to create a copy relationship. If the command is given, it is determined to have been received by the configuration interface, and it executes the copy relationship. If the command is not given, no relationship is made at that time).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Tremain discloses determining if said copy service relationship

comprises a remote FlashCopy relationship (Tremain - ¶ [0187] recites the use of Flashcopy facilities); and the remote FlashCopy relationship (Tremain - ¶ [0187] recites the use of Flashcopy facilities).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Flashcopy taught by Tremain, with the mirroring relationship taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to provide customers with available virtual machine environments (Tremain - ¶ [0187]).

17. Claims 9-10, 19-20 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. as applied to claims 1, 11 and 21 above, and further in view of US 6,735,636 B1 (Mokryn et al.).

As to Claims 9, 19 and 29, the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. discloses the system of claims 1, 11 and 21 respectively, further comprising the steps of:

determining if said requested copy service relationship comprises adding a new source logical volume and/or a new target logical volume to an existing [*mirroring*]

session comprising an existing logical volume group (Hewlett-Packard – Page 21 recites the “lvextend” command which adds physical extents allocated to a logical volume, hence the logical size changes as well. If the command is given, the volume is extended. If the command is not given, then volume is not extended);

operative if said requested copy service relationship comprises adding a new source logical volume or a new target logical volume to an existing [mirroring] session, determining if said new source logical volume and/or said new target logical volume are assigned to said existing logical volume group (Hewlett-Packard – Page 21 recites the “lvextend” command targeted to a specific volume. The Logical Volume Manager (Page 5) knows whether the volume belongs to a volume group);

operative if said new source logical volume and/or said new target logical volume are assigned to said existing logical volume group, adding said new source logical volume and/or said new target logical volume to said existing [mirroring] session (Hewlett-Packard – Page 21 recites the “lvextend” command which adds physical extents allocated to a logical volume, hence the logical size changes as well. If the command is given, the volume is extended. If the command is not given, then volume is not extended).

The combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al. does not disclose, but Mokryn et al. disclose Concurrent Copy relationship (Mokryn et al. – Column 2, lines 41-49 recite using Concurrent Copy for mirroring).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Concurrent Copy taught by Mokryn et al., with the

mirroring copy system taught by the combination of Hewlett-Packard, Padmanabhan et al. and Merkey et al.

One of ordinary skill in the art at the time the invention was made would have been motivated to apply commercially available mirroring methods (Mokryn et al. – Column 2, lines 41-49).

As to Claims 10, 20 and 30, the combination of Hewlett-Packard, Padmanabhan et al., Merkey et al. and Mokryn et al. disclose the system of claims 9, 19 and 29 respectively, further comprising the step of:

operative if said new source logical volume and/or said new target logical volume are not assigned to said existing logical volume group, not adding said new source logical volume and/or said new target logical volume to said existing [*mirroring*] session (Hewlett-Packard – Page 21 recites the “lvextend” command which adds physical extents allocated to a logical volume, hence the logical size changes as well. If the command is given, the volume is extended. If the command is not given, then volume is not extended).

Hewlett-Packard does not disclose, but Mokryn et al. discloses Concurrent Copy relationship (Mokryn et al. – Column 2, lines 41-49 recite using Concurrent Copy for mirroring).

The motivation and obviousness arguments are the same as in Claim 9.

**Conclusion**

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. These include:

- US 2003/0120699 A1 Variable synchronicity between duplicate transactions
- US 6,351,792 B1 Selective remote storage copy system and methods
- US 6,131,148 A Snapshot copy of a secondary volume of a PPRC pair
- US 5,920,695 A Method and means for bidirectional peer-coupled communication across a single ESCON interface
- US 2003/0051111 A1 Remote copy control method, storage sub-system with the method, and large area data storage system using them
- US 2002/0144070 A1 Processing method for copying between memory device data regions and memory system
- US 5,577,222 A System for asynchronously duplexing remote data by sending DASD data grouped as a unit periodically established by checkpoint based upon the latest time value
- US 5,592,618 A Remote copy secondary data copy validation-audit function
- US 5,809,332 A Supplemental communication between host processor and mass storage controller using modified diagnostic

- commands
- US 6,070,173 A      Method and apparatus for assisting garbage collection process within a java virtual machine
- US 6,078,932 A      Point-in-time backup utilizing multiple copy technologies
- US 6,212,531 B1     Method for implementing point-in-time copy using a snapshot function
- US 2002/0078296 A1   Method and apparatus for resynchronizing paired volumes via communication line
- US 6,578,120 B1     Synchronization and resynchronization of loosely-coupled copy operations between a primary and a remote secondary DASD volume under concurrent updating
- US 2002/0103980 A1   Method, system, and program for discarding data in a storage system where updates to a primary storage device are shadowed in a secondary storage device
- US 6,554,679 B1     Interactive virtual character doll
- US 5,875,479 A      Method and means for making a dual volume level copy in a DASD storage subsystem subject to updating during the copy interval
- US 2002/0024974 A1   Jitter reduction in Differentiated Services (DiffServ) networks

- US 2005/0008015 A1 MPLS device enabling service providers to control  
service levels in forwarding of multi-labeled packets
- US 2004/0010510 A1 Method and system for database synchronization
- US 6,105,122 A I/O protocol for highly configurable multi-node  
processing system
- US 2002/0194429 A1 Method and apparatus for cache synchronization in a  
clustered environment
- US 2002/0188711 A1 Failover processing in a storage system

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard G. Keehn whose telephone number is 571-270-5007. The examiner can normally be reached on Monday through Thursday, 9:00am - 8:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bunjob Jaroenchonwanit can be reached on 571-272-3913. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RGK

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